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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

# FOREST INSECT CONTROL

## CORTE MADERA PROJECT, CLEVELAND NATIONAL FOREST, CALIFORNIA

by

K. A. SAL'AN
Bureau of Entomology

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## Introduction

The cruise, upon which the information contained in this report is based, was conducted as a part of the program for pine beetle extermination in this area, as suggested by Mr. J.M. Miller in his report of March 25, 1930.

The recreational values at stake, which have been enhanced by the construction of several summer homes within the area, undoubtedly warrant the expense involved; and, with the peculiar isolation and condition of tree growth existing and the present low intensity of infestation, the chances of securing an extremely low rate of insect loss, or even of exterminating the western pine beetle by the use of maintenance control measures, are apparently very good. Maintenance control necessitates systematic inspection of the area, and treatment of the infested trees at a time when the broods are in the trees. Winter brood trees can and should be treated on all parts of the area; but in some cases where fire risk is great, difficulty will be experienced in treating all the summer brood trees unless solar heat methods of control are used. However, if present values are to be protected and conserved, systematic insect control is necessary as a part of the ordinary routine of managing the area.

## Character of Infestation

The insects involved in the death of trees in this area are as follows:

Western Pine Beetle, Dendroctonus brevicomis Lec., in Coulter pine;
Pine Flatheaded Borer, Melanophila californica V.D., in Coulter and Jeffrey pines;
Smaller Western Pine Engraver, Ips latidens (Lec.), in Jeffrey pine;
Oregon Pine Engraver, Ips oregoni (Eich.), in Jeffrey pine.

In addition to insect causes of death, many trees show the results of attack by mistletoe plants. This injury appears to be more marked in the stand on the valley floor than on the slopes, and occasionally it appears on trees attacked by insects.

Twelve trees were marked to be cut, or to be watched for further developments. Seven of these contained broods of the western pine beetle in which parent adults, attacking adults, eggs and half to full-grown larvae were found. Four trees were found to have been attacked by the Pine Flat-headed Borer, two of which sustained a sufficiently severe attack to warrant cutting and treatment. The other two had but a portion of the upper part of the tree killed. One tree was struck and killed by lightning, but no traces of a supplementary insect attack could be found. Thus, nine of the twelve trees marked should be treated as early in the spring of 1931 as possible. Table I gives complete data concerning each tree spotted, and the accompanying map shows the approximate location of each marked tree.

It is to be noted that but one tree was spotted on the valley floor, the others being found on the higher elevations to the south and west of the valley. This condition may be explained by the fact that there was a heavy snowbreak on the slope during the winter of 1929 that furnished a supply of logs in which a summer brood developed, and also by the fact that summer brood control operations were not conducted in that area because of the fire hazard.

One Jeffrey pine that had been treated just before the cruise was made was found to contain numbers of adults of Ips oregoni (Eich.). It was not determinable that engraver beetles were the cause of the death of the tree, but it was apparent that it had been subject to attack by insects for several years, and that there were no visible evidences of attack by flat-headed borers, the only primary insect that has been found attacking Jeffrey pine in this area. A small Jeffrey pine was found attacked by Ips latidens (Lec.). It was evident that some other factor had caused weakening of the tree before the time of the attack by the engraver beetle.

Estimates of summer losses during 1930 are difficult to make, but from the evidence to be found it is doubtful if more than three standing trees carried a summer brood. A large portion of the summer brood must have developed in trees broken by snow and lying on the ground.

## Recommendations for Control

The present brood of insects will remain in the trees until some time in the spring, when conditions become favorable for a resumption of activity. The trees that have been marked for cutting should be cut and the broods destroyed in the manner indicated in Table I early in the season, before the fire hazard becomes too great and before the beetles have left the trees. It is to be expected that some trees were overlooked during the fall survey, as all infested trees do not fade sufficiently in the fall to provide a means of detection. Accordingly all additional trees showing signs of attack should be inspected, and if it is determined that they are brood trees they should be treated.

The effectiveness of the maintenance control operations cannot be determined unless sufficient records concerning the number of trees treated, location, species of tree, species of insect concerned and other data are kept. Accordingly it is recommended that some provision be made to gather these data at the time of treating. The blank sheets attached to this report provide a standard means of collecting this information, and a sufficient supply will be furnished for use on this project if requested.

## Comparison of Surveys

The cruise by Mr. J.M. Miller in March 1930 and the cruise conducted by the writer in October 1930 dealt with the overwintering brood of insects in the area, and thus it is possible to compare the results. Mr. Miller's cruise dealt with the 1929 winter brood, and that of the writer with the 1930 winter brood. Unfortunately, there

are no explicit data concerning the general trend of insect attack in this region to provide a means of comparison between treated and untreated areas. However, general observations in Pine Valley and the Laguna Recreational Area would seem to indicate that there has been no decrease in intensity of infestation during the past two seasons, while there are some indications that there has been a slight increase. In the treated area comprising the Corte Madera Project there has, however, been a marked decrease in insect injury, the decrease being particularly noticeable on the valley floor. The following comparison shows the changes that have taken place, as shown by the results of the surveys of winter brood trees:

| | 1929 | 1930 |
|---|---|---|
| Trees marked for treatment | 34 | 10 |
| " attacked by western pine beetle | 20 | 7 |
| " " flat-headed borers | 9 | 2 |
| " " engraver beetles | 5 | 1(?) |

It is not to be taken for granted that control operations alone are responsible for this great decrease in the intensity of infestation as represented by the winter broods; but in view of the fact that the infestation appears to be increasing in stands within the same general region, insect control measures may be credited with at least a portion of the decrease.

It would be desirable to continue this project, utilizing maintenance insect control measures as an accepted part of the management of the area. The decreases that have been secured represent a gain for recreational values within the area, and control operations will be justified if they help in retaining these values.

TABLE I

Forest Insect Control
Corte Madera Project
October 25-26, 1930

LIST OF INSECT-INFESTED TREES

| Tree No. | D.B.H. | Species | Insects | Disposal Recommended | Owner |
|---|---|---|---|---|---|
| 30--1 | 34 | Jeffrey | Flat-head | Green base; cause of death doubtful; will not live; cut, burn bark entire tree | C.M.R. |
| 30--2 | 34 | Coulter | W.P.Beetle | Cut, burn bark entire tree | U.S.F.S. |
| 30--3 | 20 | Coulter | W.P.Beetle | Cut, burn bark entire tree; lightning injury | U.S.F.S. |
| 30-T4 | 36 | Coulter | Flat-head? | Top 80 ft. killed this season; don't cut | U.S.F.S. |
| 30--5 | 12 | Coulter | W.P.Beetle | Heavy brood; cut, burn entire tree | U.S.F.S. |
| 30-T6 | 28 | Coulter | ---------- | Lightning kill; no insects; watch developments | U.S.F.S. |
| 30-T7 | 26 | Coulter | Flat-head | Top 10 ft. killed; should be watched | U.S.F.S. |
| 30--9 | 12 | Coulter | Flat-head | Cut, burn entire tree | U.S.F.S. |
| 30-10 | 20 | Coulter | W.P.Beetle | Cut, burn entire tree | U.S.F.S. |
| 30-11 | 20 | Coulter | W.P.Beetle | Green base; cut, burn entire tree | U.S.F.S. |
| 30-12 | 26 | Coulter | W.P.Beetle | Cut, burn entire tree | U.S.F.S. |
| 30-13 | 24 | Coulter | W.P.Beetle | Green base; cut, burn entire tree | U.S.F.S. |

Project Area— Date— Killed by—
Project Unit— Observer— Year Gen. Tree No. ----------

**Tree Species**
Yellow Pine—
Sugar Pine—
---

**Location**
T. R. Sec.
Elev.
Exposure—

Dia.
Ht.
Uninfested top ---------- ft.
Uninfested base ---------- ft.

No. 16′ logs—
Volume B. F.
Infested bark

| Age | Condition | Weakened by— | | Foliage | | Bark |
|---|---|---|---|---|---|---|
| Young | Thrifty | Mistletoe | Lightning | Green | Heavy | Thin |
| Mature | Normal | Witches broom | Spike top | Fading | Normal | Medium |
| Old | Decadent | Fungus | Fire scars | Sorrel | Sparse | Thick |
| | Fallen | Injury | Fire | Red | | Tight |
| | | | | Black | | Loose |

| | PRIMARY INSECTS | | | | | | Secondary Insects | Parasites Predators and Disease | |
|---|---|---|---|---|---|---|---|---|---|
| | D. BREV. | D. MONT. | IPS. | | | | | | |
| Attack | | | | | | | | | Woodpecker work— |
| Parent adults | | | | | | | | | Fungus on bole— |
| Eggs | | | | | | | | | Pitch tubes: |
| Larvæ 0–½ | | | | | | | | | Conspicuous— |
| Larvæ ½–1 | | | | | | | | | Inconspicuous— |
| Pupæ | | | | | | | | | Tree in group |
| New adults | | | | | | | | | |
| Emerging | | | | | | | | | |
| Abandoned | | | | | | | | | |
| Infested length | | | | | | | | | |

REMARKS:

S—1496

Form of Tree Record Used on Control Projects

Tp. 16 S. R. 4 E.

# Forest Insect Control-
## Cleveland National Forest - Calif.
## Corte Madera Project

Legend: — - — - — - Boundary of Coulter Pine - Jeffrey Pine Type.

INSECT-KILLED TREES - 1930
JEFFREY PINE •
COULTER PINE o